The oral health of dentally phobic 12- and 15-year-olds: a descriptive analysis of the 2013 Child Dental Health Survey

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Key points

- Suggests dentally phobic adolescent children are more likely to have dental decay.
- Describes how the oral health of children with a dental phobia is more likely to impact on their everyday life compared to non-dental phobic children.
- Argues dentally phobic children are less likely to show behaviour related to the prevention of dental disease, such as attending the dentist for regular examinations or brushing twice a day.

Abstract

Introduction Dental anxiety has been shown to be related to poorer oral health. Limited data exist exploring the relationship between oral health status and dental anxiety in non-clinical populations in children.

Aim To compare the oral health of phobic and non-phobic children aged 12 and 15 years.

Design Secondary analysis of data from 12-year-old and 15-year-old children in the Child Dental Health Survey 2013.

Materials and methods Participants were grouped into non-phobic and phobic groups, depending on their self-reported dental anxiety (MDAS). Descriptive analyses compared the two groups on social demographic factors, clinical status, self-reported oral health status, oral health-related behaviours and oral health impact.

Results A total of 601 children were classed as dentally phobic with 4,144 classed as non-phobic. Dental phobic children were more likely to be female, had more active decay and untreated dental disease, and rated their dental health as poorer. Phobic children were more likely to report that their oral health had a negative effect on their everyday life. This group were less likely to brush their teeth regularly or attend the dentist for check-ups.

Conclusions Dentally phobic children have more dental disease and express greater impact on their everyday life.

Introduction

A fear of dental treatment is well documented in both the adult and child population.[1,2] Dental fear is defined as a loss of control and the anticipation that something traumatic will happen in relation to dentistry.[3] Dental phobia is defined as a severe and out of proportion fear of dentistry leading to avoidance and impacting on everyday life.[4] Previous research has suggested that dental fear in adults impacts on their daily life,[5,6,7] leading to psychological distress and even increased time on sick leave.[8,9] The research into children's dental anxiety and its effect on the child's oral health and oral health-related behaviour is sparser.

The reported prevalence of dental anxiety in children differs, depending on the study, from 9% to 22%.[3,10] Qualitative studies to examine what the child perceives when faced with the dental environment have been undertaken,[11] suggesting that a cognitive behavioural therapy assessment model may be useful to understand childhood dental anxiety and gain some insight in to what children perceive as averse when attending the dentist. There have also been small-scale studies that suggest the child's oral health-related quality of life is worse if the child is dentally anxious.[12]

In the UK, the 2013 Child Dental Health Survey (CDHS) resulted in the publication of a broad overview on dental anxiety prevalence and relationships. Participants aged 12- and 15-years-old were asked to self-rate their anxiety levels and reported that 62% of 12-year-olds and 54% of 15-year-olds stated they had anxiety when attending the dentist; a further 14% of 12-year-olds and 10% of 15-year-olds stated they had extreme anxiety.[13] There was no reported relationship between eligibility to free school meals, a marker of social deprivation, but there was a difference between the genders, with girls more likely to report extreme anxiety.

The aim of this paper is to use the data generated by the highly refined methodology of the CDHS to perform a descriptive analysis of relationships between dental anxiety and gender, social deprivation, oral health status, oral health-related behaviours and oral health-related quality of life.

Materials and methods

The study constituted an analysis of the data that were gathered during the 2013 CDHS. This was the fifth in a series of surveys, completed every ten years, to look at the dental health of children in England, Wales and Northern

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Ireland. Questionnaires also allowed an insight into the children's experience of dentistry and their oral health-related behaviours and attitudes. Further details on the methodology of the 2013 Child Dental Health Survey are available online.[13]

Assessment of fear

Participants, aged 12 and 15 years, were grouped into non-phobic and phobic groups depending on their self-reported dental anxiety. This was scored using the Modified Dental Anxiety Scale (MDAS).[14] This scale asked the participants to score how they felt in different scenarios, such as having a local anaesthetic, ranging from not anxious to extremely anxious on a five-point scale. Scores were summed and those participants with a total of 19 or above were ranked as phobic (n = 601), based on the work and validation of numerous studies.[15,16,17] Scores below were ranked as non-phobic (n = 4,144).

Data analysis

Social and demographic variables, variables found at clinical examination, the child's self-reported oral health status, behaviours that impact on oral health and oral health impact variables were tabulated (Table 1) and grouped according to whether the children were phobic or not and analysed using SPSS version 25. A simple statistical analysis was conducted using cross tabulation and a chi-squared test. As multiple hypotheses were being tested, a Bonferroni correction was applied to allow for the increased chance of a rare event leading to incorrectly rejecting the null hypothesis. Following this correction, the result was deemed significant if P = <0.002. The variables chosen are listed in the following sections.

Social and demographic

1. Gender
2. Free school dinner eligibility. This was used by the CDHS as a measure of poor socio-economic status. Parents can claim free school dinners for their children if they claim unemployment benefits, an income-related support allowance or help due to immigration status.

Clinical findings

1. Number of decayed, missing, filled teeth (DMFT or decay experience), according to the 2003 criteria which states 'All teeth with cavitated or visual dentine caries, restorations with cavitated or visual dentine caries, teeth with filled decay (otherwise sound) and teeth extracted due to caries. Excludes teeth with enamel caries present. The term obvious decay experience relates to teeth with dentinal cavities, missing teeth and filled teeth in the DMFT dental decay index.'[18] This was grouped into two groups: no decay experience; and decay experience
2. Active decay present in the mouth. This included caries with cavitation and caries with no cavitation. This was grouped into two groups of no decay present and decay present
3. Indications of soft tissue lesions: ulceration, fistula or abscess (PUFA). This was used as a measure of the clinical consequences of untreated dental caries, with the results grouped into: a) no soft tissue lesion seen; and b) soft tissue lesion seen.

Variables related to the child's own reported oral health status

These measures were gathered via a questionnaire given to the child:

1. Child's self-rated dental health, scored on a scale of one to five, rating from very good to very poor. The variable was divided into two groups: 'very good/good' and 'fair/worse'

Table 1 Social and demographic features of participants

Variable		12 year and 15 year age group: non-phobic	12 year and 15 year age group: phobic	χ^2	P value
Gender	Male	2,107 (51%)	181 (30%)	90.3	<0.002
	Female	2,037 (49%)	420 (70%)		
Free school dinner eligibility	Yes	938 (24%)	149 (27%)	1.8	0.179
	No	2,970 (76%)	411 (73%)		

Table 2 Clinical findings

Variable		12 year and 15 year age group: non-phobic	12 year and 15 year age group: phobic	χ^2	P value
Number of teeth with active caries	0 teeth	2,959 (71%)	375 (62%)	20.4	<0.002
	1+	1,185 (29%)	226 (38%)		
Number of permanent teeth filled	0 teeth	2,655 (64%)	377 (63%)	0.4	0.523
	1 + teeth	1,489 (36%)	224 (37%)		
Number of primary teeth filled	0 teeth	4,051 (98%)	587 (98%)	0.2	0.895
	1 + teeth	93 (2%)	14 (2%)		
Number of teeth extracted due to caries	0	3,853 (93%)	536 (89%)	10.9	<0.002
	1+	291 (7%)	65 (11%)		
PUFA	Yes	106 (3%)	33 (6%)	16.2	<0.002
	No	4,016 (97%)	561 (94%)		
Any decay experience	Yes	2,207 (53%)	242 (40%)	8.9	0.03
	No	1,937 (47%)	359 (60%)		

2. Child's self-rated general health, scored on a scale of one to five, rating from very good to very poor. The variable was divided into two groups: 'very good/good' and 'fair/worse'
3. Child reported toothache in the last three months, scored 'yes' or 'no' and grouped accordingly
4. Child reported sensitive tooth in the last three months, scored 'yes' or 'no' and grouped accordingly
5. Child reported bleeding or swollen gums in the last three months, scored 'yes' or 'no' and grouped accordingly
6. Child reported broken tooth in the last three months, scored 'yes' or 'no' and grouped accordingly
7. Child reported mouth ulcers in the last three months, scored 'yes' or 'no' and grouped accordingly
8. Child reported bad breath in the last three months, scored 'yes' or 'no' and grouped accordingly.

Variables related to oral health-related quality of life

CHILD-OIDP, an oral health-related quality of life index for children.[19] This was broken down into eight aspects:

1. Child reports difficulty eating in last three months
2. Child reports difficulty speaking in last three months
3. Child reports difficulty cleaning teeth in last three months
4. Child reports difficulty relaxing or sleeping in last three months
5. Child reports that they felt different in last three months
6. Child reports difficulty smiling, laughing, showing teeth in last three months
7. Child reports difficulty doing schoolwork in last three months
8. Child reports difficulty enjoying being with people in last three months.

An overall score was then calculated.

Variables related to behaviours impacting on oral health

1. Child reported frequency of toothbrushing. Data were divided into two groups: those who said that they brushed the recommended two times daily and those who said that they brushed once daily or less
2. Child reported usual dental attendance. Data were divided into two groups: those who attended regularly for dental examinations and those who only attended when they had 'trouble with their teeth' or never attended
3. Child reported consumption of sugary food, grouped into two groups: four or more times in a day and less than four times a day
4. Child reported consumption of sugary drinks, grouped into two groups: four or more times in a day and less than four times a day
5. Self -reported orthodontic treatment. Previous research has highlighted that children who have experienced orthodontic treatment tend to be less anxious.[12] Children were asked to report if they were having orthodontic treatment, if they have previously had orthodontic treatment or if teeth had been extracted for orthodontic reasons previously.

Table 3 Child's self-reported oral health status

Variable		12 year and 15 year age group: non-phobic	12 year and 15 year age group: phobic	χ^2	P value
Self-rated dental health	Very good/ good	2,947 (71%)	351 (59%)	38.6	<0.002
	Fair/worse	1,175 (29%)	244 (41%)		
Self-rated general health	Very good/ good	3,599 (87%)	471 (79%)	28.7	<0.002
	Fair/worse	526 (23%)	124 (31%)		
Reported toothache in the last three months	Not mentioned	3,467 (84%)	482 (80%)	4.2	0.04
	Mentioned	676 (16%)	118 (20%)		
Reported sensitive tooth in the last three months	Not mentioned	2,789 (67%)	381 (64%)	3.3	0.071
	Mentioned	1,347 (33%)	217 (36%)		
Reported swollen or bleeding gums in the last three months	Not mentioned	3,416 (86%)	470 (78%)	6.2	0.013
	Mentioned	724 (14%)	130 (22%)		
Reported broken tooth in the last three months	Not mentioned	3,848 (93%)	545 (91%)	3.3	0.070
	Mentioned	294 (7%)	55 (9%)		
Reported mouth ulcers in the last three months	Not mentioned	3,306 (80%)	473 (79%)	0.4	0.519
	Mentioned	835 (20%)	128 (21%)		
Reported bad breath in the last three months	Not mentioned	3,403 (82%)	459 (76%)	12.1	<0.002
	Mentioned	743 (18%)	142 (24%)		

Results

A total of 601 12- and 15-year-olds were classified as dentally phobic (12.7%) with 4,144 children classified as non-phobic (87.3%). Mean 12.43, SD 4.9. The socio-demographic variables are shown in Table 1. Girls were more likely to be classed as dentally phobic. Eligibility for free school meals, used as an indicator of socio-economic status, indicated that there was no association with dental phobia. The percentages stated refer to the proportion of participants in either the non-phobic or phobic group. For example, 51% of non-phobic children were male and 49% were female. In the phobic group 30% were male and 70% were female.

Table 4 Oral health-related behaviour

Variable		12 year and 15 year age group: non-phobic	12 year and 15 year age group: phobic	χ^2	P value
Frequency of brushing teeth	Twice a day	3,218 (78%)	413 (70%)	21.1	<0.002
	Once a day or less	889 (22%)	178 (30%)		
Pattern of attendance at dentist	For a check-up	3,439 (84%)	445 (74%)	33.9	<0.002
	Only when trouble/never	669 (16%)	156 (26%)		
Frequency of eating sugary food	Four times or more a day	2,624 (64%)	376 (63%)	0.2	0.631
	Less than four times a day	1,463 (36%)	219 (37%)		
Frequency of having sugary drink	Four times or more a day	1,296 (32%)	194 (34%)	0.5	0.469
	Less than four times a day	2,711 (68%)	379 (66%)		
Undergoing orthodontic treatment at time of survey	Yes	586 (14%)	68 (11%)	3.585	0.058
	No	3,544 (86%)	532 (89%)		
Appliance worn in past	Yes	359 (10%)	40 (8%)	3.325	0.68
	No	3,122 (90%)	477 (12%)		
Any teeth extracted for orthodontic reasons?	No	3,718 (90%)	543 (9%)	0.227	0.634
	Yes	426 (10%)	58 (91%)		

The variables found during the clinical examination are shown in Table 2. Phobic patients were more likely to have: i) active decay; ii) teeth extracted due to decay; and iii) a higher PUFA score. The reported oral health status of phobic versus non-phobic groups is reported in Table 3. Phobic children were more likely to have lower self-rated dental and general health, and self-reported bad breath.

Regarding the variables relating to quality of life, the phobic children reported more difficulty eating, cleaning teeth, and reported that they felt different and had difficulty smiling, laughing and showing teeth without embarrassment as well as difficulty enjoying being with people. A sum of the scores given for the questions related to oral health affecting quality of life (Child OIDP) were analysed with Student's t-test and showed a significant difference in means between the phobic and non-phobic groups ($p = 0.001$).

The variables relating to oral health-related behaviour are shown in Table 4. Phobic children were more likely to brush less than twice a day and attend when only in trouble or not at all. There was no demonstrable relationship between dental phobia and sugar consumption.

Discussion

The aim of this study was to assess the relationship of dental phobia and variables related to oral health. This study is among the first to assess this and utilised the data gathered from the well-planned 2013 Child Dental Health Survey. However, the use of MDAS as an anxiety measure may not have been ideal. The threshold value used to determine extreme dental anxiety has been validated on adult populations and may not be appropriate for use on the adolescent population group studied here.[20] However, some authors suggest there is no definitive anxiety measure for use with children.[21]

The overall picture described by the data is that dentally phobic children in these age groups are more likely to have dental-related disease. In addition, these data clearly suggests that the child's oral health impacts on their quality of life, with phobic children reporting that they were more likely to have physical (eating, cleaning their teeth) and psychological (feeling different, embarrassed) difficulties. The prevalence of dental phobia in this population group is in line with the previous research. The relationship of dental anxiety and gender has been noted before,[22] and previous research has highlighted that females are more likely to be dentally phobic.[3,7]

There was no significant difference between the phobic and non-phobic children in relation to treated caries such as primary or permanent teeth filled. There was a difference between the DMFT of non-phobic versus phobic patients, but this was not deemed as significant ($p = 0.03$). There was no demonstrable relationship between orthodontic treatment and dental phobia.

These data clearly suggest that there is an impact of the child's oral health on their quality of life. Phobic children reported that they were more likely to have physical (eating, cleaning their teeth) and psychological difficulties (feeling different, embarrassed) due to their oral health. This is in keeping with other studies' findings on adults.[5,23] Self-esteem generally decreases during adolescence,[24] but the impact of poor oral health on a child's self-esteem may lead to a greater effect on development over time. Further work needs to be undertaken to assess this.

Previous research has suggested that dentally phobic adults actively undertake preventative measures by using mouthwash.[7] This does not seem to apply to these children, but children are less likely to use mouthwash compared to adults; indeed, in the UK children would not be able to purchase mouthwashes containing alcohol without assistance from a caregiver.

There is a demonstrable link between caries experience and dental phobia in this and other research.[12] It can be hypothesised that phobic children experience a higher rate of dental disease due to three possible factors. Firstly, the differences are due to a third factor related to phobia and oral health. For example, social class, which previous studies have shown a relationship between poorer oral health and an increased chance of dental phobia. However, this study showed no significant relationship between social class and phobia.

Secondly, there are differences in treatment approaches for phobic and non-phobic children. For example, dental phobics are more likely to choose a tooth extraction over

extensive oral rehabilitation. These data may support this hypothesis, with phobic children being more likely to have teeth extracted due to decay but no more likely to have teeth restored despite having more active decay or signs of untreated disease. Dentists may feel that there are fewer restorative options for phobic children, due to behavioural management problems. Recent research suggests that the level of behavioural knowledge of the profession is poor.[25] Improving the application of non-pharmacological behavioural management may allow more conservative treatment on this phobic population group.

Finally, the differences in attendance are a result of fear. The link between irregular attendance and dental phobia is well supported and it has been postulated that this is due to escape/avoidance behaviour leading to the patient being negatively reinforced, resulting in greater avoidance of the dentist in the future.[26,27] However, with this age range the parents or caregiver are responsible for the child's attendance. We therefore must consider why the parent does not bring a child in need of treatment to the dentist. This may well be due to the parent not prioritising the child's oral health, a lack of knowledge about the importance of regular check-ups, or the parent avoiding the dental environment due to their own dental fear or fear of the dentist's criticism. Sadly, no data was available to analyse how the parent's anxiety affected the findings in this study. Further research is needed to fully investigate the reasons parents do not bring children to the dentist.

Conclusion

This research helps to provide a greater understanding of the oral health of dental phobics and demonstrates the need for the profession to investigate more fully the challenges faced by this population group. However, the amount of theories postulated above demonstrates that this simple descriptive analysis has notable limitations. Therefore, there is a need to perform a multivariate analysis to fully understand the true relationships that we have touched upon here.

It is our opinion that this research demonstrates this population group face significant challenges due to dental anxiety, poor oral health and the significant impact this has on their self-esteem. Given the increasing evidence that behavioural therapies can lead to a long-term change in a person's beliefs about dentistry, this seems to be a sizeable tragedy.[28,29,30] These interventions can lead to a long-term benefit for both the patient's health and the future economic burden on both the individual and the state.

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